

REMARKS

In the last Office Action, claims 3-4 were withdrawn from further consideration as being directed to a non-elected invention. Claim 40 (which should be claim 41) was objected to because of informalities noted by the Examiner, and appropriate correction was required. Claims 27, 28, 36, 41 and 47 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for the reasons noted by the Examiner.

Claims 1, 2, 22, 24, 29, 30, 32, 34, 35, 37-40, 46 and 47 were rejected under 35 U.S.C. §103(a) as being unpatentable over JP2002-162332 (JP'332) in view of US 6,388,239 to Muramatsu. Claim 19 was rejected under 35 U.S.C. §103(a) as being unpatentable over JP'332 in view of Muramatsu and further in view of US Patent Application Publication 2002/0054285 to Todo et al. ("Todo"). Claims 44 and 45 were rejected under 35 U.S.C. §103(a) as being unpatentable over JP'332 in view of Muramatsu and further in view of US 3,982,943 to Feng.

Claims 5-15, 20, 21, 23, 25, 26, 31, 33 and 41-43 were objected to as being dependent upon a rejected base claim and were otherwise indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 27, 28, 36 and 47 were indicated to be allowable if amended to overcome the rejection under 35 U.S.C. §112, second paragraph, and if

amended to include all of the limitations of the base claim and any intervening claims.

In accordance with this response, allowable dependent claims 5, 20, 23, 25, 31, 33, 41 and 42 have been rewritten in independent form including, where applicable, the subject matter of any intervening claims. Claims 1-47 have been revised in formal respects to improve the wording and to overcome the objections and indefiniteness rejections made by the Examiner. New claims 48-52 have been added, and each of the newly added claims is directed to the elected invention. The specification has been revised in formal respects to improve the wording, correct informalities and ensure a direct antecedent basis for the claim language.

Applicants and applicants' attorney greatly appreciate the Examiner pointing out allowable subject matter as well as pointing out informalities that require correction.

Claim 41 (not claim 40) has been amended in the manner suggested by the Examiner to overcome an obvious typographical error. Claims 27 and 28 have been amended to depend on claim 5, claim 36 has been amended to depend on claim 34 and claim 47 has been amended to depend on claim 46 thereby overcoming the indefiniteness rejection of these claims due to lack of antecedence. In claim 41, the term "trace amounts" has been deleted thereby overcoming the indefiniteness rejection.

Allowable dependent claims 5, 20, 31, 33, 41 and 42 have each been rewritten in independent form to incorporate the subject matter of base claim 1, thereby placing these claims and the claims dependent thereon in allowable form. Allowable dependent claim 23 has been amended to incorporate the subject matter of base claim 1 and intervening claim 22, and allowable dependent claim 25 has been rewritten in independent form to include the subject matter of base claim 1 and intervening claim 24, thereby placing these claims in allowable form. In addition, these independent claims have been amended in formal respects to better conform them to U.S. practice.

Independent claim 1, as amended, recites a method of manufacturing a light-propagating probe which has a light-propagating body that terminates at one end in a hook-shaped section having a sharpened tip section at a free end thereof, the tip section being coated with a metal film coating except at the end tip thereof to form a transparent opening at the end tip for passing light, a portion of the light-propagating body that extends rearward of the hook-shaped section constituting a spring operating part for functioning as a cantilever capable of being displaced in a direction perpendicular to a sample surface, and the light-propagating body having a reflecting surface for carrying out optical position detection of the tip section,

the method comprising a step of sharpening the light-propagating body, a step of forming the light-propagating body in a hook-shape, a step of forming the reflecting surface, a metal film coating step for forming the transparent opening, a step of protecting the transparent opening with a resist material, a metal film coating step for coating the reflecting surface and the spring operating part, and a step of removing the resist material.

Claim 1 was rejected as being obvious over JP'332 in view of Muramatsu. Applicants respectfully traverse this rejection and submit that amended claim 1 and the claims dependent thereon patentably distinguish over the prior art.

JP'332 discloses a method of manufacturing a light-propagating probe comprised of a solid light-propagating body that is sharpened by chemical etching and formed into a hook-shape. A metal film coating of aluminum is applied over the light-propagating body to form an optical opening (transparent opening) 1004 at the tip of the light-propagating body 1001 (Fig. 10). A resin material 1405 is applied over the optical opening (Fig. 14) to form a resin coating 1502 (Fig. 15). Then a metal film coating of aluminum is applied around the periphery of the light-propagating body (Fig. 15) to avoid leakage of light (paragraph [0044]), after which the resin coating is removed.

As recognized by the Examiner, JP'332 does not disclose or suggest forming a reflecting surface on the light-propagating body, nor does JP'332 disclose coating the reflecting surface and the spring operating part with a metal film coating, as required by amended claim 1. To supply this deficiency in JP'332, the Examiner relies on Muramatsu and contends that it would have been obvious to one of ordinary skill in the art to modify the method disclosed by JP'332 to include a step of forming a reflecting surface on the light-propagating body to enable observation at wavelengths in the ultraviolet and infrared regions as taught by Muramatsu, citing column 1, lines 8-31. Applicants respectfully disagree.

Muramatsu discloses methods for manufacturing a light-propagating probe comprised of a tubular -- not solid -- probe body 15, and the method of making a tubular light-propagating probe is markedly different from that of manufacturing a solid light-propagating probe, and the two types of probes have different operating characteristics. For example, in the method of manufacturing the tubular light-propagating probe of Muramatsu, a tubular probe body 20 is sharpened (Fig. 5A), the sharpened probe body is formed into a hook-shape (Fig. 5B), a reflecting surface 15 is formed on the probe body by grinding (Fig. 5C) and a metal film coating 60 is applied over the spring operating part of the

probe body (Fig. 5D). However, the manufacturing method of Muramatsu does not employ a step for forming a transparent opening, a step of protecting the transparent opening with a resist material, and a step of removing the resist material. This is because in the case of a tubular light-propagating body, such as disclosed by Muramatsu, the transparent opening (microscopic aperture) is formed in the step of sharpening the probe body (Fig. 5A) and since the microscopic aperture is an open space, there is no need to protect the aperture with a protective resist material during the application of the thin metal film 60. By contrast, in the case of a solid light-propagating body, as in the case of the present invention, the transparent opening at the tip end of the solid light-propagating body must be protected with a resist material prior to coating the reflecting surface and the spring operating part of the probe body with a metal film coating.

One of ordinary skill in the art would not have been led by any teaching in Muramatsu, which pertains to the art of tubular light-propagating probes, to modify JP'332, which pertains to the art of solid light-propagating probes, as set forth in the rejection. Moreover, provision of the reflecting surface in Muramatsu is not to enable observation at wavelengths in the ultraviolet and infrared regions; for this purpose, a part of the tubular probe body that is opposite to

the microscopic aperture is removed to form a second aperture that is opposite the microscopic aperture so that no obstacle exists in the space between the microscopic aperture and the second aperture.

It is well settled that the Examiner must satisfy his burden of establishing a prima facie case of obviousness by showing that some objective teaching or suggestion in the applied prior art taken as a whole and/or knowledge generally available to one of ordinary skill in the art would have led that person to the claimed invention, including each and every limitation of the claims, without recourse to the teachings in applicant's disclosure. See generally, In re Rouffet, 47 USPQ2d 1453, 1456, 1457-1458 (Fed. Cir. 1998); In re Oeticker, 24 USPQ2d 1443, 1446-47 (Fed. Cir. 1992). In this case, the Examiner has failed to carry his burden of making out a prima facie case of obviousness with respect to the subject matter of amended independent claim 1 and the claims dependent thereon.

With respect to dependent claim 19, the Examiner has relied upon the additional reference to Todo as teaching testing for the presence of absence of cavity defects in an optical fiber. However, Todo teaches testing the entire length of an optical fiber during formation of the fiber -- not during the manufacture of a light-propagating probe. As amended, claim 19 specifically requires a step of testing for

presence or absence of cylindrical cavity defects in at least a part of the light-propagating body that is to be sharpened. Clearly, no such teaching is disclosed or suggested in Todo.

Newly added independent claim 48 is likewise directed to a method of manufacturing a light-propagating probe and includes, inter alia, coating a pointed tip section of a hook-shaped section of a light-propagating body with a metal film coating to form a transparent opening that is free of the metal film coating at the tip end of the pointed tip section, applying a resist material over the transparent opening, forming a reflecting surface on the hook-shaped section for use in optically detecting the position of the pointed tip section during use of the light-propagating probe, coating the remainder of the hook-shaped section, including the reflecting surface, and a resilient spring section of the light-propagating body with a metal film coating, and thereafter removing the resist material from the transparent opening. As noted above with respect to amended independent claim 1, the combined teachings of JP'332 and Muramatsu do not disclose or suggest such a method. Therefore claim 48, like claim 1, patentably distinguishes over the prior art.

New claim 49 includes the limitation that the forming of a pointed tip section is carried out by applying spring tension to the light-propagating body while locally heating the tensioned light-propagating body to cause tension

fracture thereof. New claim 50 recites that the coating of the pointed tip section to form the transparent opening is carried out in two, separate metal-film deposition stages. New claim 51 recites that the coating of the remainder of the hook-shaped section and the resilient spring section is carried out by vacuum deposition or sputtering from at least two directions around the center axis of the resilient spring section. New claim 52 recites that the applying of a resist material over the transparent opening comprises inserting the tip end of the pointed tip section having the transparent opening into the resist material and determining the amount of insertion of the tip end into the resist material through observation using a microscope. None of these limitations is disclosed or suggested in JP'332 or Muramatsu or Todo.

In light of the foregoing, the application is now believed to be in allowable form. Accordingly, favorable reconsideration and passage of the application to issue are respectfully requested.

Respectfully submitted,

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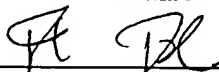
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